Land Surface Reflectance: A Possible Earth Science Product Content Standard

3rd Joint Earth Science Data System Workng Group Meeting

Standards Process Breakout Session

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MODIS Land Surface Reflectance Example

Reflectance corrected for gaseous and aerosol scattering and absorption, surface adjacency effects caused by variations in land cover and atmospheric/surface coupling effect

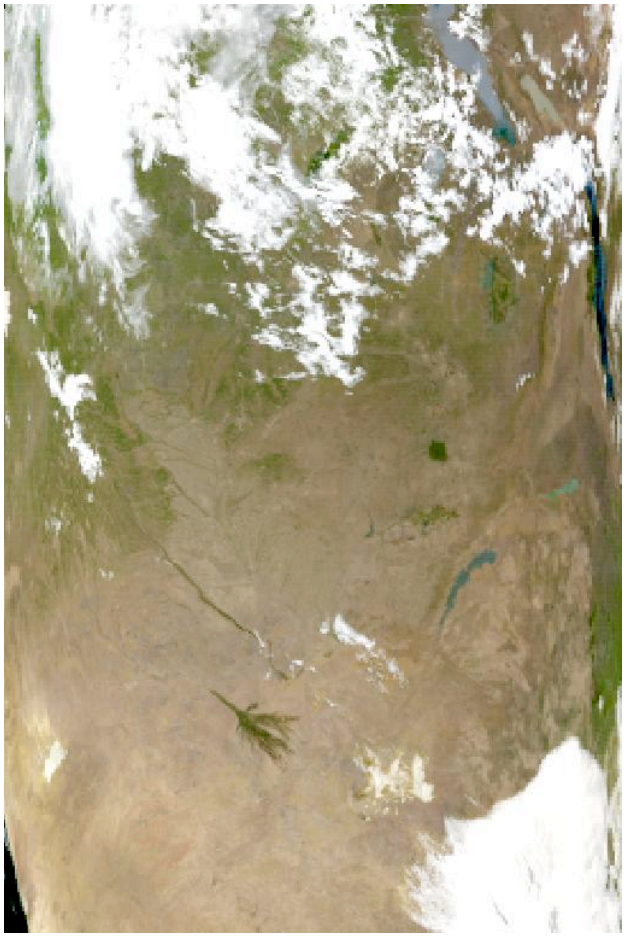
Building block for many land products:

VI, BRDF/Albedo and LAI/FPAR

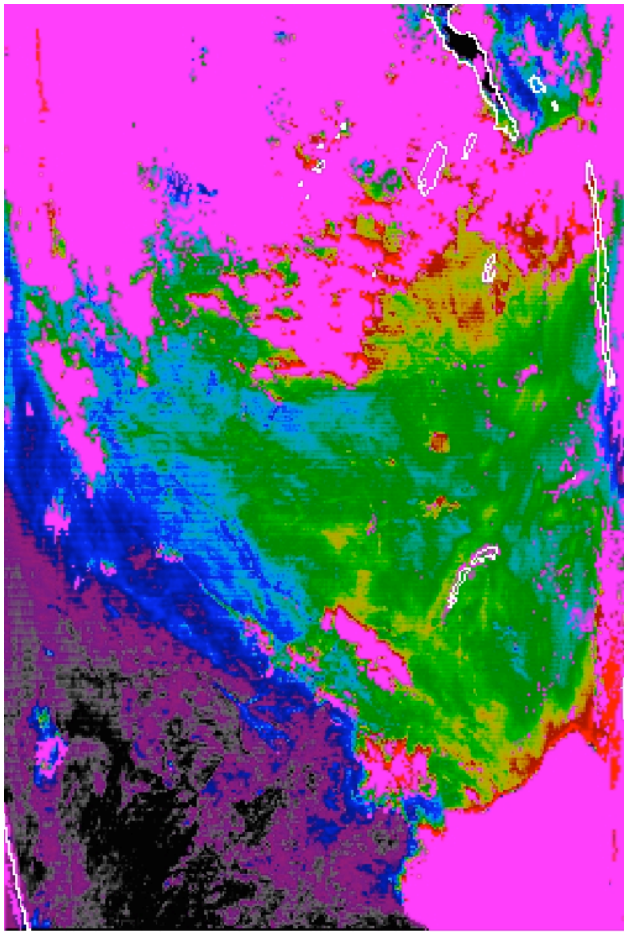
From: E. Vermote, UMD

MODIS Surface Reflectance South Africa

RGB no correction for aerosol effect



RGB surface reflectance (corrected for aerosol)



Corresponding aerosol optical thickness at 670nm (0 black, 1.0 and above red) linear rainbow scale. Clouds are in magenta, water bodies are outlined in white.

Sept,13,2001, 8:45 to 8:50 GMT

Product Content Standards Areas

- Units (unitless): reflectance
- Accuracy
  - 5% relative, 0.05 absolute etc.
- Bands
  - wavelengths and spectral shapes
- Type of atmospheric correction
  - none (top of the atmosphere)
  - rayleigh correction
  - correction other atmospheric components (Ozone, H2O, etc.)
  - aerosol correction (method)
  - adjacency correction (method)
  - BRDF coupling correction (method)
  - nadir adjustment (BRDF model/method)
- Per pixel QA information
  - magnitude of aerosol correction (low, medium, high)
  - cloud and cloud shadow
  - snow flag
  - land/water flag
- Supplemental information
  - Viewing geometry (view and solar zenith and azimuth angles)
  - Geolocation (lat/long/height, reference datum, terrain correction (elevation model), accuracy)
  - Calibration source
- Format
  - L2/swath (swath details)
  - L3/grid (grid details)
  - metadata (metadata details)
- Gridded products temporal compositing
  - daily, 8, 10, 16, monthly, etc.
  - rolling vs. batch
  - compositing method
  - gap filling

Target Communities

- Land earth science community
  - Energy Balance
    - Surface Reflectance
    - BRDF/Albedo
  - Vegetation Parameters
    - Vegetation Indices
    - Leaf area index (LAI), Fraction of photosyntheticly active radiation (FPAR)
    - Gross and Net Primary Production (GPP/NPP)
  - Land Cover/Land Use
    - Land Cover/Vegetation Dynamics
    - Vegetation Cover Change and Continuous Fields
    - Burned Area
- Climate modeling community
- Education and outreach communities
- Application communities
- National and international communities

Benefits of a standard

- Easier interchange and use of land surface reflectance products
- Surface reflectance sources
  - NASA EOS: MODIS, MISR, Aster, etc.
  - NOAA: AVHRR, VIIRS, GOES, etc.
  - USGS: Landsat
  - Commercial: IKONOS, etc.
  - International: SPOT, MERIS, IRS, CBERS, etc.

Standard Development Players

- National and international scientists
- Data producers
- Data users
- Possible Forums –
  - CEOS International Albedo Working Group?
  - BRDF Working Group